

REMARKS

The Examiner has rejected claims 1, 2, 4, 5, and 8 under 35U.S.C. §102(b) as being clearly anticipated by Kuyucak, U.S. Patent No. 5,427,691, particularly by the disclosure at column 3, lines 8-30, therein. Kuyucak '691 teaches a lime-treatment method that neutralizes acidic waters in two stages, using two reactors. In the first reactor, the pH is increased to 4-4.5, using recycled sludge and, if necessary, lime. In this first reactor, ferric hydroxides are precipitated and other metal hydroxides are dissolved. In a second reactor, lime and a small amount of recycled sludge are introduced to adjust the pH to 9-10, and the ferric hydroxides precipitated in the first reactor are fed to the second reactor, where they act as nuclei to promote crystallization. From a teleconference held between Applicant's attorney and the Examiner, it is Applicants' understanding that the Examiner holds that the crystallization effect of the ferric hydroxides anticipates the claimed "at least one precipitating agent" of claim 1. Regarding claim 2, the Examiner holds that the "lime" recited as a neutralizing agent in Kuyucak '691 would anticipate the "limestone" of claim 2. Regarding claim 4, the Examiner notes that "ferric hydroxides" are precipitated in the first reactor, thus encompassing the "iron" and/or "iron oxides" of that claim. If the Examiner's position with respect to claim 5 was understood correctly by Applicants' attorney, the Examiner holds that the water treated in the cited reference comes from and returns to a natural stream of water. Finally, regarding claim 8, the Examiner notes that the pipe joining reactor 10 to reactor 12, in Fig. 1 of the cited reference, would contain both the at least one neutralizing agent (recycled sludge and lime) and the at least one precipitating agent (the ferric hydroxide precipitated in the first reactor).

In light of the amendments to the claims requested above, it is Applicants' position that the anticipation rejection is not valid, and Applicants respectfully request reconsideration of the amended claims, in light of the arguments presented below. As amended, claims 1, 3 and 6 are independent. Claims 2, 4, 5, and 7-11 depend from claim 1, while claims 3 and 6 have no dependent claims.

With respect to independent claim 1, Applicants note that the claim now contains the limitation that both the neutralizing agent and the precipitating agent must be "lithic." It is understood in the art that "lithic" materials are stone materials, which would not include the

"ferric hydroxides" that serve as crystallization nuclei in the Kuyucak process. On this basis, reconsideration of claims 1, 2, 4, 5, and 7-11 is respectfully requested.

Regarding independent claims 3 and 6, Applicants note that the Examiner had indicated that claims 3 and 6 were objected to as being dependent upon a rejected base claim, but would be allowed if presented in independent form. Applicants have endeavored to present these claims in independent form, and it is believed that they are in condition for allowance.

Regarding the amendments to the specification, they are not provided in response to any objections raised by the Examiner, but rather are offered simply to correct minor, non-substantive errors.

In light of the foregoing, reconsideration of all pending claims is respectfully requested, and a Notice of Allowance is earnestly solicited. Should the Examiner wish to discuss any of the foregoing in greater detail, the undersigned attorney would welcome a telephone call.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

In the event a fee is required with the filing of this Amendment and the required fee is not enclosed or is deemed insufficient, the Assistant Commissioner of Patents and Trademarks is hereby authorized to withdraw the required funds from Deposit Account No. 18-0987. If a withdrawal is required from Deposit Account No. 18-0987, the undersigned attorney respectfully requests that the Assistant Commissioner of Patents and Trademarks cite Attorney Docket Number UA372 for billing purposes.

Respectfully submitted,



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Attachment: Version with Markings to Show Changes Made

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

In the Summary of the Invention, please replace the paragraph beginning on page 4, line 21, with the following rewritten paragraph:

--The typical metals targeted for removal from aqueous solutions include iron, iron oxide, silica, aluminum oxide, aluminum, magnesium, cadmium, copper, chromium, nickel, lead, and zinc. Generally, the process of the present invention may be employed to remove these[s] and other dissolved or suspended metals during a change in pH of the aqueous solution. It should therefore be appreciated that [an] any lithic material capable of preferentially precipitating such metals from an aqueous solution may be employed as the precipitating agent.--

In the Detailed Description of the Invention, please replace the paragraph beginning on page 5, line 15, with the following rewritten paragraph:

--One preferred embodiment of the invention is a single-stage or multi-stage process in which water is passed across or through a mixture of natural or synthetic lithic materials. The mixture placed in the reactor includes both a neutralizing agent along with at least one precipitating agent that preferentially precipitates metals from the aqueous solution. As mentioned above, the disclosure that the at least one precipitating agent "preferentially precipitates" metals indicates that the precipitating agent(s) serve [material] as a preferred locus of deposition of metals when they precipitate from the aqueous solution during neutralization. This prevents the neutralizing agent from being coated, and allows it to continue its neutralizing function.--

In the Detailed Description of the Invention, please replace the paragraph beginning on page 6, line 3, with the following rewritten paragraph:

--In another preferred embodiment the invention is a process for removing metals from water by bringing the water in contact with at least one neutralizing agent, which may be limestone, marble, calcium carbonate, calcite, dolostone, dolomite and/or any other basic material. The water is also brought into contact with at least one precipitating agent, which may be sandstone, quartz, siltstone, quartzarenite, arkose, shale, feldspar, illite, gravel, granite, basalt, conglomerate, schist, slate, gneiss, diorite, gabbro, and rhyolite[.], or any other material that preferentially precipitates iron, iron oxide, silica, aluminum, aluminum oxide, magnesium, magnesium oxide, copper, copper oxide, chromium, chromium oxide, nickel, nickel oxide, lead, lead oxide, zinc, zinc oxide, cadmium, or any other dissolved or suspended metal during a change in the pH of the water. The water may be from any source which includes, but is not limited to, stream water, river water, ground water, natural and man-made reservoirs, run-off water, process water, waste water, sewage water, storm water, aquifers and lake water.--

In the Claims:

The claims have been amended as follows:

- 1 1. (Amended) A process for removing metals from an aqueous solution comprising the
2 steps of:
3 contacting said aqueous solution with at least one lithic neutralizing agent and
4 at least one lithic precipitating agent that preferentially precipitates metals from the
5 aqueous solution.
- 1 3. (Amended) [The] A process [of claim 1] for removing metals from an aqueous
2 solution comprising the steps of:
3 contacting said aqueous solution with at least one lithic neutralizing agent and
4 at least one lithic precipitating agent that preferentially precipitates metals from the
5 aqueous solution, wherein the at least one precipitating agent is selected from the

6 group consisting of sandstone, quartz, siltstone, quartzarenite, arkose, shale, feldspar,
7 illite, gravel, granite, basalt, conglomerate, schist, slate, gneiss, diorite, gabbro, and
8 rhyolite.

1 6. (Amended) [The] A process [of claim 6]for removing metals from an aqueous
2 solution comprising the steps of:
3 adding at least one neutralizing agent and at least one precipitating agent to a
4 natural stream of water, wherein the at least one neutralizing agent and at least one
5 precipitating agent are added as large blocks so that the water passes over and around
6 the blocks.

1 7. (Amended) The process of claim [6]5, wherein the at least one neutralizing agent and
2 at least one precipitating agent are added in gravel form.

1 9. (Amended) The process of claim [9]8, wherein the at least one neutralizing agent and
2 the at least one precipitating agent are provided in the pipe as a mixture of pieces of
3 the at least one neutralizing agent and the at least one precipitating agent.

1 10. (Amended) The process of claim [9]8, wherein the at least one neutralizing agent and
2 the at least one precipitating agent are provided in the pipe as alternating rings.

1 11. (Amended) The process of claim [9]8, wherein said step of contacting an aqueous
2 solution includes utilizing a pump to urge the aqueous solution through the pipe.